

Guidelines for Student Reports

Extensive Validation and Debugging of VELA Plugin

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Abstract

Atoll is a professional software used for electromagnetic planning studies. Atoll enables several studies (ex. Coverage by Signal Level, Coverage by Transmitter, ...) about the signal propagation of several technologies (ex. UMTS-HSPA, GSM, CDMA2000, etc.) on maps representing the regions characteristic, for example digital terrain model and density of population.

The principal users of this software are especially the mobile phone operators, they are interested in the knowledge of coverage and performance of their mobile telephone network.

Besides these analyses, Atoll permits the interface with external plugins, they can interact with it and make available new types of analysis to the end users.

ELEDIA Research Center, in collaboration with Vodafone, has developed VECOM (Vodafone Eledia COverage Model), an Atoll plugin able to calculate the coverage probability in every pixel of a map.

The plugin VELA (Vodafone Eledia pLAnning tool) is the object of this activity. It is a PSO-based optimization tool that permits to evaluate, in an automated way, the optimal values of:

- 1 - channel power CPICH,
- 2 - azimuth of the antennas of the transmitters,
- 3 - mechanical downtilt of the antennas of the transmitters,
- 4 - height of the antennas of the transmitters,

in order to satisfy the particular targets imposed by the user in terms of coverage probability in every pixel of the analysis map.

The optimization tool, at every iteration of optimization, implements the following procedure:

- 1 - The PSO-based optimization tool calculates the new values of the features previously listed;
- 2 - VECOM calculates the new coverage probability in every pixel of the map;
- 3 - The PSO checks the coverage probability:
 - 3.1 - if the result satisfies the target imposed by the user or the number of iterations reaches the maximum, the optimization procedure ends;
 - 3.2 - otherwise it continues with another iteration.

The proposed activity has the goal of an extended validation and the debugging of the VELA plugin, with the aim of using the system already developed and to provide conclusions about: the correct working of the system, the presence of malfunctioning and the performance of the plugin, for example the necessary time to complete a simulation and how the calculation result are close to the target imposed by the user.

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